CLAIMS

1. A driving-operation assist characterized by comprising:

circumferential-state imaging means for imaging a circumferential state of a vehicle with a camera and generating a circumferential-state image and/or storing the generated circumferential-state image;

synthetic-image generating means for generating a synthetic image by superimposing on the circumferential-state image, an assumed-movement pattern which is the video data showing movement of the vehicle in case of performing a predetermined series of driving operations for the vehicle; and

displaying means for displaying the synthetic image.

2. The driving-operation assist according to claim 1, characterized in that

the circumferential-state imaging means has one camera or more and a camera parameter table for storing a camera parameter which is a characteristic of the camera or each of the cameras and generates the circumferential-state image on the basis of the camera parameter from an output of the camera or each of the cameras.

3. The driving-operation assist according to claim 2, wherein

the circumferential-state imaging means has space reconfiguring means for generating space data obtained by relating each pixel constituting an image output from the camera or each of the cameras to a point in a three-dimensional space on the basis of the camera parameter, and viewpoint converting means for generating an image viewed from a predetermined viewpoint as said circumferential-state image by referring to the space data and the synthetic-image generating means generates the synthetic image by referring to the space data.

4. The driving-operation assist according to claim 3, characterized in that

a space-data buffer for temporarily storing the space data is included.

5. The driving-operation assist according to claim 3 or 4, characterized in that

the predetermined viewpoint is a point fixed to the three-dimensional space or the vehicle, and

the viewpoint converting means changes the predetermined viewpoint automatically or through an input from a driver.

6. The driving-operation assist according to ~~any one of claims 1 to 5~~ any one of claims 1 to 4, characterized in that

the assumed-movement pattern includes video data showing the relation between an assumed-movement start area which is an area in which the vehicle at start of the movement of the vehicle when performing the above predetermined series of driving operations is present and an assumed-movement end area which is an area in which the vehicle at end of the movement is present.

7. The driving-operation assist according to claim 6, characterized in that

the assumed-movement pattern includes video data showing tire traces of the vehicle and/or video data showing a movement area of the vehicle.

8. The driving-operation assist according to claim 6 ~~or 7~~, characterized in that

the assumed-movement pattern includes video data showing virtual poles arranged on the outer edge of the vehicle movement area.

9. The driving-operation assist according claim 6 ~~to any one of claims 6 to 8~~, characterized in that

the synthetic-image generating means superimposes current-position data serving as video data showing an area in which the vehicle is present, on the circumferential-state image to generate the synthetic image.

10. The driving-operation assist according to claim 9, characterized in that

the synthetic-image generating means superimposes the assumed-movement start area on a position same as the current-position data.

11. The driving-operation assist according ~~to any one of claims 6 to 10~~ claim 6, characterized in that

when actual driving operations corresponding to the above predetermined series of driving operations are started,

the synthetic-image generating means thereafter fixes the positional relation between the assumed-movement pattern and the circumferential-state image at the point of time when the actual driving operations are started and generates the synthetic image.

12. The driving-operation assist according to claim 11, characterized in that

positional-information storing means is included which stores positional information of the whole or a part of the video data for the assumed-movement pattern with regard to the basis of the whole or a part of the video data for the circumferential-state image on the synthetic image when the actual driving operations are started,

the synthetic-image generating means fixes the positional relation in accordance with the positional information.

13. The driving-operation assist according to claim 11, characterized in that

movement-position computing means is included which computes movement positions of the vehicle since the actual driving operations were started, in accordance with signals relating to the actual driving operations, and

the synthetic-image generating means fixes the positional relation in accordance with the movement positions.

14. The driving-operation assist according to claim 6 ~~to any one of claims 6 to 13~~, characterized in that

final-position inputting means for inputting a final position which is a position of the vehicle at end of the movement and start-position determining means for obtaining a start position which is a position at start of the movement corresponding to the input final position in accordance with the assumed-movement pattern are included, and

the synthetic-image generating means superimposes the input final position and the start position corresponding to the input final position on the

circumferential-state image to generate the synthetic image.

15. The driving-operation assist according to claim 14, characterized in that

start-position guiding means is included which guides the vehicle to the start position by automatically controlling driving of the vehicle.

16. The driving-operation assist according to any one of claims 1 to ~~15~~ 4, characterized in that

assumed-movement-pattern storing means is included which holds data relating to the above predetermined series of driving operations and holds assumed-movement data including at least the assumed-movement pattern.

17. The driving-operation assist according to claim 16, characterized in that

the assumed-movement-pattern storing means holds a plurality of assumed-movement patterns, and

pattern selecting means is included which automatically selects the assumed-movement pattern through an input from a driver or a predetermined driving operation.

18. The driving-operation assist according to claim 16 ~~or 17~~, characterized in that pattern correcting means is included which is able to update and correct the content

of the assumed-movement pattern held in the assumed-movement-pattern storing means.

19. The driving-operation assist according to claim 18, characterized in that the pattern correcting means updates and corrects the assumed-movement pattern and/or the assumed-movement data in accordance with the vehicle positions at start and end of the corrected movement input from a driver.

20. The driving-operation assist according to claim 18, characterized in that the pattern correcting means updates and corrects the assumed-movement pattern and/or the assumed-movement data in accordance with an actual driving operation.

21. The driving-operation assist according to claim 16 ~~to any one of claims 16 to 20~~, characterized in that the assumed-movement data includes time-series data showing a relation between a movement distance and a steering angle of the steering wheel of the vehicle.

22. The driving-operation assist according to claim 21, characterized in that driving control means is included which automatically controls driving of the vehicle in accordance with the time-series data when actual driving operations corresponding to the above predetermined series of driving operations are started.

23. The driving-operation assist according to ~~any one of claims 11 to 13 or claim 22~~ claim 11, characterized in that operation-start detecting means is included which automatically detects that actual driving operations corresponding to the above predetermined series of driving operations are started through an input from a driver or a predetermined driving operation.

24. The driving-operation assist according to ~~any one of claims 5 to 23,~~ claim 5 characterized in that

when the viewpoint converting means changes the predetermined viewpoint, the viewpoint converting means fixes the predetermined viewpoint to the vehicle before the actual driving operations corresponding to the predetermined series of driving operations are started and changes the predetermined viewpoint to a point fixed to the three-dimensional space after the actual driving operations corresponding to the predetermined series of driving operations are started.

25. The driving-operation assist according to claim 24, characterized in that the point fixed to the three-dimensional space is a point just above the position at end of the movement of the vehicle shown by the assumed-movement pattern when the actual driving operations are started.

26. The driving-operation assist according to any one of claims 1 to ~~5~~ 4, characterized in that the assumed-movement pattern includes video data showing a circumscribed area on a space through which the vehicle passes when the predetermined series of driving operations are performed.

27. The driving-operation assist according to claim 6, characterized in that the assumed-movement pattern includes video data showing a trace when maximizing a steering angle of tires of the vehicle clockwise or counterclockwise and/or video data showing movement areas of the vehicle.

28. The driving-operation assist according to claim 16, characterized in that the assumed-movement-pattern storing means holds the assumed-movement patterns and is provided with synthetic-image generating means for generating a synthetic image by simultaneously superimposing two or more of the assumed-movement patterns on the circumferential-state image and displaying means for displaying the synthetic image.

29. The driving-operation assist according to any one of claims 1 to ~~5~~ 4, characterized in that the assumed-movement patterns respectively include a change from backward movement to forward movement or from forward

movement to backward movement in the predetermined series of driving operations.

30. The driving-operation assist according to any one of claims 1 to 5, characterized in that obstacle inputting means is included which is able to input a position of an obstacle area in an image to displaying means for displaying the synthetic image from a driver.

31. The driving-operation assist according to claim 17, characterized in that

the pattern selecting means selects one of the assumed-movement patterns in accordance with an obstacle-area position input from a driver, and

obstacle inputting means is included which is able to input a position of an obstacle area in an image to displaying means for displaying the synthetic image from a driver.

32. The driving-operation assist according to claim 18, characterized in that

the pattern correcting means updates and corrects the assumed-movement patterns and/or the assumed-movement data in accordance with a position of an obstacle area input from a driver, and

obstacle inputting means is included which is able to input a position of an obstacle in an image to displaying means for displaying the synthetic image from a driver.

33. A recording medium characterized by storing a program of making a computer execute all or some of functions of each means of any one of claims 1 to ~~32~~ 4.

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